JFI Abstracts from 2025

Issue 4: Oct - Dec 2025

Documentation of Obscured Latent Prints through Mirrored Photography

Author(s): Trenum, Doug
Type: Case Report
Published: 2025, Volume 75, Issue 4, Page 315
Abstract: A latent print was located on the activation switch of a vehicle gear shift. It was developed using yellow fluorescent powder, viewed through a blue forensic light source, and an orange barrier filter. The location of the latent print was difficult to document using traditional photographic procedures, due to its placement. Ultimately, a mirror was used to view and photograph the print in a reflective format. A latent print examiner subsequently identified the print. This case report describes how to overcome obscured latent prints in difficult photographic environments. It explains using a mirror to view and document reflective latent print evidence through photography, and outlines how reflective photos should be oriented for later examination.

Effectiveness of the Bullet Hole Testing Kit (B.T.K) on Tampered Bullet Entry Holes

Author(s): Abu-Rezek, Adam; Ammar, Noam; Mero, On; Grafit, Arnon
Type: Article
Published: 2025, Volume 75, Issue 4, Page 329
Abstract: The lead and copper detection capabilities of the Bullet Hole Testing Kit (B.T.K.) was assessed on bullet holes in five car doors produced by 9 x 19 mm Parabellum and 5.56 x 45 mm ammunition. This study included the assessment of B.T.K.'s metal detection before and after five different tampering methods: scrubbing with a scouring pad, washing with water and soap, treatment with bleach, high-pressure water rinsing, and burning. Prior to tampering, bullet entry holes from 9 mm Parabellum ammunition exhibited significantly weaker reactions for both lead and copper compared to those created by 5.56 mm ammunition. Burning and high-pressure rinsing significantly reduced lead presence in 9 mm Parabellum entry holes, while scrubbing had a greater impact on copper. In 5.56 mm entry holes, lead was notably reduced by bleach, high-pressure rinsing, and scrubbing, whereas copper levels remained largely unaffected. This study demonstrates that specific tampering actions can significantly diminish the detectable presence of lead and copper residues in bullet entry holes. These findings provide critical insights for forensic investigations, particularly in assessing the influence of tampering on ballistic evidence.

Evaluation of the RECOVER LFT System: Semi-Controlled and Pseudo Operational Experiments

Author(s): CravenÃ¢, Nicoals; YounglingÃ¢, Hailey; WalthallÃ¢, Tina
Type: Article
Published: 2025, Volume 75, Issue 4, Page 352
Abstract: The RECOVER LFT has been the topic of some recent research into the development of latent prints on cartridges and cartridge cases. In the current study, semi-controlled and pseudo-operational samples were tested under various conditions. In the semi-controlled section, two experiments, pre-washing samples and comparing to the traditional processing sequence, were conducted using cartridges and cartridge cases composed of differing metals. For the pre-washing experiment, half of the samples were washed prior to processing with RECOVER LFT while the other half was directly processed with RECOVER LFT. This experiment demonstrated that washing items before processing with RECOVER LFT is not recommended. The RECOVER LFT was compared to the traditional processing sequence where the RECOVER LFT performed as good or better on brass but not as well as the traditional sequence on nickel, steel, and aluminum. A simulated loading, unloading, and firing experiment along with

gun range samples were used to test the RECOVER LFT in a pseudo-operational setting. The simulated samples (fired and unfired) yielded better results than the gun range samples (fired).

Evaluating Optimized Crystal Violet vs. Rhodamine 6G and RAY in the Recovery of Latent Prints on Water Submerged Surfaces

Author(s): NettÃ¢, Amanda; Miller, Brooke
Type: Article
Published: 2025, Volume 75, Issue 4, Page 393
Abstract: Evidence at a crime scene is susceptible to adverse environmental conditions such as rain or water submersion. This poses a challenge for forensic technicians when processing this evidence for latent prints. This study aims to explore the quality of latent print development on 720 prints using RAY, Rhodamine 6G, and Optimized Crystal Violet after nonporous surfaces were submerged in water. Three different surfaces underwent a specified aging period prior to cyanoacrylate fuming, followed by dye stain processing. The data indicates that RAY and Rhodamine 6G produce favorable latent print enhancement capabilities throughout each time frame on each surface. Additionally, a new chemical formula, Optimized Crystal Violet, provided fair to average results under this study's objective.

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Author(s): Siegel, Sandy CLPE Coordinator
Type: Article
Published: 2025, Volume 75, Issue 4, Page 410
Abstract: Funny finds from all over in their own words.

Issue 3: Jul - Sep 2025

Assessment of Factors Influencing the Contrast Enhancement Capabilities of Basic Yellow 40 on Cyanoacrylate-Developed Fingermarks

Author(s): Müller, Elaine; Correll, Mathias; Klenke, Inga; Schwarz, Lothar
Type: Technical Note
Published: 2025, Volume 75, Issue 3, Page 225
Abstract: This study investigates the influence of the time interval between cyanoacrylate fuming and Basic Yellow 40 (BY40) staining on the quality of ridge detail in marks deposited under ideal conditions. Using groomed marks, the use of ethanol-based BY40 did not show significant differences in terms of trace quality on these idealized marks when time intervals of up to two weeks are involved. The results therefore suggest that the time interval is less decisive than initially assumed. Deviations were recorded for glass and glossy magazine paper, which yielded results of poor quality. Furthermore, two-fold staining with BY40 did not show added value in comparison to single-application under the testing conditions, but material-dependent differences were observed.

The Efficacy of Bleach for Blood Decontamination of Evidence Placards

Author(s): Enzweiler, Anna; Kenneway, Laura; Kang, Chelsea; Pettolina, Maria
Type: Technical Note
Published: 2025, Volume 75, Issue 3, Page 237
Abstract: Crime scene investigation is a fundamental aspect of forensic science, where maintaining the integrity of evidence is essential for its admissibility in court. The repeated use of crime scene equipment introduces significant risks of cross-contamination, while standardized decontamination protocols may remain vague or absent. This study

evaluates the efficacy of the Activate™ 10:1 Institutional Bleach Dilution System for decontaminating blood from evidence placards, focusing on varying submersion intervals. Results demonstrate that placards submerged for 30 minutes or more, followed by hand-drying and airdrying, achieved optimal decontamination levels when assessed using Hemastix® presumptive testing. The findings emphasize the importance of environmental and resource considerations, emphasizing the need for further validation under diverse operational conditions. This research addresses a critical gap identified by the Organization of Scientific Area Committees (OSAC) in the standardization of decontamination practices and highlights the necessity for ongoing advancements in mitigating cross-contamination risks during forensic investigations.

Rediscovering Foundations: The Probabilistic Model of Windt and Kodicek(1904) For Fingerprint Rarity

Author(s): Gomes, Gabriel Ângelo da Silval; Yukihiro Matsushita, Raul
Type: Article
Published: 2025, Volume 75, Issue 3, Page 250
Abstract: Estimating fingerprint rarity using probabilistic models has been crucial in advancing forensic sciences, beginning with Sir Francis Galton's pioneering work in 1892. Among the historical contributions, the 1904 probabilistic model proposed by Windt and Kodicek has yet to be recognized. This study revisits their calculation that two identical tenprints would require 4,660,337 centuries to appear, critically analyzing their assumptions and methodology. By situating this model chronologically alongside those of Galton, Henry, and Balthazard, we highlight its foundational significance and influence on Locard's tripartite rule. Our findings suggest that while the calculations by Windt and Kodicek appear to be conservative, they remain a vital reference in understanding early approaches to fingerprint rarity estimation. This historical reassessment not only corrects misconceptions in the attribution of their work but also underscores their contribution to the evolution of forensic identification science.

Early Criminal Cases Solved with Friction Ridge Impressions in Brazil: A Historical-Forensic Perspective

Author(s): Gomes, Gabriel Ângelo da Silval
Type: Article
Published: 2025, Volume 75, Issue 3, Page 259
Abstract: Friction ridge evidence in forensic investigations was a significant milestone in criminal identification. While the first documented case of fingerprint evidence solving a crime occurred in Argentina in 1892, its early applications in Brazil remain largely unexplored. This study examines some of Brazil's earliest documented criminal cases solved through finger and palm mark evidence dating back to 1912. This study reconstructs early forensic methodologies through documentary research in historical archives, including the Boletim Policial (1907–1918), the official publication of the Bureau of Identification and Statistics in Rio de Janeiro. The findings demonstrate friction ridge impressions in crime scene examinations, highlighting the role of Elysio de Carvalho, the Rio de Janeiro Police School, and Rodolphe Reiss in advancing forensic sciences in Brazil.

Patterning in the Distal Portions of the Palms as a Key to Palm Print Identification

Author(s): Tonietto, Angela; Santos, Jemima de Jesus
Type: Article
Published: 2025, Volume 75, Issue 3, Page 274
Abstract: The interdigital and distal thenar regions of palms exhibit intense patterning, with pattern elements frequently present at the volar pad sites and locations proximal to each digit (base sites). This study investigated the frequency of these patterns, both separately and in combination. It also examined the statistical relationships between pattern type, location, and hand, while highlighting differences and similarities between hands. The analysis involved 4,000 palmprints from a Brazilian population. Results revealed some pattern arrangements common to both hands, while others occurred exclusively in one hand. In general, the left hand presents greater variability. Chi-

squared and Fisher's exact tests (independent analysis) showed an association between certain patterns and the side of occurrence (right/left). McNemar's test (paired analysis) resulted in no statistical difference between the hands of the same individual, except at base site 4. The frequency of pattern arrangements was population-dependent and yielded an additional resource to improve identification accuracy. Integrating pattern frequency data into automated systems and forensic evaluations can enhance the precision and reliability of palm print identification, especially in cases involving poor-quality marks. This study contributes toward a more systematic and objective approach to friction ridge analysis of palm prints.

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Author(s): Siegel, Sandy CLPE Coordinator
Type: Article
Published: 2025, Volume 75, Issue 3, Page 310
Abstract: Funny finds from all over in their own words.

Issue 2: Apr - Jun 2025

Linking Crime Scenes via Toolmark Comparison of Construction Nails

Author(s): Aronson, Ayal; Pertsev, Roman
Type: Case Report
Published: 2025, Volume 75, Issue 2, Page 153
Abstract: This case report demonstrates the linking of three crime scenes via the forensic examination of construction nails located at each scene. These nails could easily have been ignored at the beginning of the investigation because they did not seem to be a significant finding. However, thanks to the creative thinking "outside the box" of the crime scene investigator, samples of nails from each scene were collected and sent for toolmark comparison in the laboratory. The microscopic comparison showed correspondences in manufacturing marks between subsets of the nails from each scene. These nails turned out to be significant evidence, helping to link the three scenes. In this case, the suspects were linked to one of the scenes via additional forensic evidence. The totality of the evidence led to the submission of an indictment to the court.

Oil Red O Comparison and Evaluation

Author(s): Harrison, Mary Monks; DiLuzio, Amanda; Allred, B. McKay
Type: Article
Published: 2025, Volume 75, Issue 2, Page 165
Abstract: The development of prints on wet or previously wetted substrates can be difficult as many print processing techniques focus on enhancing the water-soluble components in latent print residues. However, there are latent print techniques that stain the hydrophobic components that can also define print ridge detail. Physical Developer (PD) has been utilized for lipid enhancement since approximately 1975, and Oil Red O (ORO) was first documented for the development of latent prints on porous substrates in 2004 by Beaudoin et al. Since then, the capability of ORO has been explored by various researchers. The present work tested the relative performance of two common ORO solutions, including a propylene glycol solution and a methanol solution with sodium hydroxide. Developed print quality of up to twenty donors on previously wetted papers were measured using expert evaluations and automated clarity scores then benchmarked against PD. The variability introduced during print deposition was accounted for by randomly assigning replicates to different treatment groups. In contrast to previous reports, the methanol-based solution was observed to typically develop prints of higher quality except for prints on one type of thermal paper tested. The quality of ORO produced prints relative to PD varied inversely with the individual donor, highlighting the complementary nature of these two techniques.

Benchmarks for Time to Identify Unidentified Human Remains

Author(s): Metcalf, Roger D.
Type: Article
Published: 2025, Volume 75, Issue 2, Page 187
Abstract: This paper presents a summary of the findings from a Capstone project the author conducted as part of the Doctor of Forensic Sciences program at Oklahoma State University. The study aimed to develop benchmarks for the time required to identify unidentified human remains (UHR) at the Tarrant County Medical Examiner's Office (TCME). The Burr Type XII statistical distribution was initially used to model the identification time for over 8,200 UHR cases spanning the period from 2004 to 2020. Notably, the simple mode of identification times provided a more accurate ref lection of practical experience compared to the Burr mean. To enhance data visualization, a bar graph with variable-width bins was used, which highlighted the complex long-tail characteristics of the data. While the benchmarks are highly specific to this office, they may serve as a reference for other forensic professionals seeking to develop similar benchmarks for their own settings.

Expert and Trainee Performance Determining Bullet Directionality of Shots Fired Through Vehicle Windshields with Three Documentation Methods

Author(s): Ammar, Noam; Abu-Rezek, Adam; Shmilovitz, Matan; Altman, Eli; Grafit, Arnon
Type: Article
Published: 2025, Volume 75, Issue 2, Page 199
Abstract: In forensic ballistics, the perforation of glass by a bullet leaves characteristic marks, such as radial and concentric fractures and cones, which are crucial for reconstructing the bullet's trajectory and the shooting scene. Traditionally, digital forensic photography has been used to document these distinct characteristics. This research compared the ability of experts and trainees to accurately assess the directionality of bullets shot through vehicle windshields using photography and two innovative approaches: 1) paper and pencil to create a frottage and 2) latent print powder and gel lift. Two vehicle windshields were shot six times, from the outside and the inside, by two different types of ammunition. The inside and outside of each bullet hole was documented via the three methods. The documentation for each bullet crater was blindly presented to experts and novices to assess their accuracy determining entry versus exit. The two innovative approaches of paper and pencil method and gel lift method produced higher accuracy for both experts and trainees when compared to traditional photography. Furthermore, there was no significant difference in accuracy of the experts and novices. This work aims to contribute to the ongoing refinement of forensic ballistics methodologies, enhancing the precision and reliability of evidence collection in the field.

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Author(s): Siegel, Sandy CLPE Coordinator
Type: Article
Published: 2025, Volume 75, Issue 2, Page 220
Abstract: Funny finds from all over in their own words.

Issue 1: Jan - Mar 2025

Forgery of Friction Ridge Impressions by Transfer of Undeveloped Residue

Author(s): Recker, Daniel C.
Type: Technical Note
Published: 2025, Volume 75, Issue 1, Page 1
Abstract: This small scale study looked at the feasibility of transferring undeveloped residue from one non-porous sur-face to another using tape. The transferred residue was then processed using powder to see if a forged latent print resulted. Forged latent prints that were suitable for comparison were developed in 30% of the ten trials.

Interagency Study of Crime Scene Investigation Using Virtual Reality

Author(s): McKay, Jaclynn; Grassel, John; Keyes, Kelly; Hill, Edward; Thomas, Nicholas
Type: Article
Published: 2025, Volume 75, Issue 1, Page 8
Abstract: To facilitate the development of standards for crime scene investigation (CSI) and to improve the field of forensic science, RTI International conducted a national interagency comparison study on crime scene (CS) processing using virtual reality (VR) scene recreations. The study assessed participants' performance in CS processing across a variety of individual and agency characteristics. A total of 163 participants completed a sexual assault scene, with 92 of which completing a second scene: overdose or assault. Study findings indicated that prior experience with VR was not necessary to use its capabilities regarding simulated CS processing. Out of the processing variables assessed, swabbing DNA samples, glove use, and number of photos taken had the most significant distributions across the characteristics assessed, indicating these skills may have the biggest variability across crime scene teams or are the most different in the virtual space. Although certain regions performed better than others in certain areas, on the whole larger crime scene units, CSI primary function, more CSI experience, and more scenes worked exhibited better performance. Those at agencies with forensic accreditation demonstrated better performance across all three scenes with regards to glove use. There was a lot of positive feedback regarding processing scenes in the virtual world including being time-efficient, relatively low-cost, and easy-to-use; however, VR is not suitable for all people due to the potential for motion sickness and headaches, and there are some limitations to the technology with regards to demonstrating CSI skills.

Forensic Examination of Fire Accelerants in Waterproofing Bitumen Sheets.

Author(s): Avissar, Yaniv Y.; Rezek, Adam Abu; Grafit, Arnon; Stier, Erez; Kasherman, Yonit
Type: Article
Published: 2025, Volume 75, Issue 1, Page 103
Abstract: Bitumen, also known as asphalt, are a form of petroleum and are used mainly in waterproofing. Analysis of samples of bitumen sheets in Arson investigations could lead to incorrect interpretations. The importance of data interpretation in arson case investigation is discussed in this work. As no similar studies were found in the literature, several properties of bitumen sheets were studied. Background tests of ten different types of bitumen sheet samples showed presence of flammables compounds at intensities lower than the laboratory's threshold for accelerant identification. Additionally, the findings from bitumen sheets subjected to diesel or gasoline highlighted the differences between bitumen and inert media. Results indicate fuel that had been in contact with the sheets was still detectable 24 hours after exposure. In addition, no changes were found in the composition of accelerants applied to bitumen media, contrary to what investigators expect to find in residue analyses in arson cases.

Hitting the Mark: A Bespoke Imaging System for the Enhanced Capture of Lifted Marks

Author(s): Marsh, Nick P.; Hart, Andrew J.; Bleay, Stephen; Hall, Lisa J.
Type: Article
Published: 2025, Volume 75, Issue 1, Page 128
Abstract: This study was conducted to compare the efficacy of an agency's existing protocol for scanning transparent lifts of aluminum powder marks using a flatbed scanner to a bespoke in-house photographic alternative. Preliminary testing and an operational trial demonstrated that using a bespoke imaging system improved the quality and clarity of marks that had been previously determined to be unsuitable or borderline for comparison. This, in turn, resulted in more identifications and exclusions being reported. The significance of the findings of this research was such that the bespoke system has been introduced into routine operational casework.

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Author(s): Siegel, Sandy CLPE Coordinator
Type: Article
Published: 2025, Volume 75, Issue 1, Page 151
Abstract: Funny finds from all over in their own words.